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Chapter VIII

Medical Care of Castaways and the Rescued

INTRODUCTION

THIS CHAPTER DEALS WITH SURVIVAL after abandonment of a vessel or aircraft at sea. It describes the medical treatment of survivors on the survival craft and aboard the rescue vessel. The need for prior training on these principles and continuing follow-up instruction cannot be overemphasized. During an abandonment, there will be little or no time to review a manual.

ABANDONMENT OF VESSEL (Ditching)*

Lifeboat drills must be conducted to prepare for possible disaster. Both crew and passengers must be instructed in the procedures to be followed. Reasons for the instructions should be given to all concerned because procedures will be remembered better when the necessity for them is understood.

Forced immersion is the primary hazard to life after surviving the initial impact of hitting the water. It should be kept in mind that no ocean or lake has a temperature equal to body temperature. Thus in all latitudes, anyone in open water will lose heat, and heat loss lowers the internal body temperature. As the internal body (core) temperature (taken by rectum) falls below normal (*generalized hypothermia*), the heart increasingly becomes prone to develop ventricular fibrillation and cardiac arrest.

The extent to which generalized hypothermia threatens life is determined by the water temperature and time of exposure. The bodily effects of subnormal temperature will vary depending on geography, season of the year, duration and activity in the water, and body insulation (the amount of fatty tissue and clothing of the individual). (See Fig. 8–1 and Generalized (Immersion) Hypothermia p. VIII–3.)

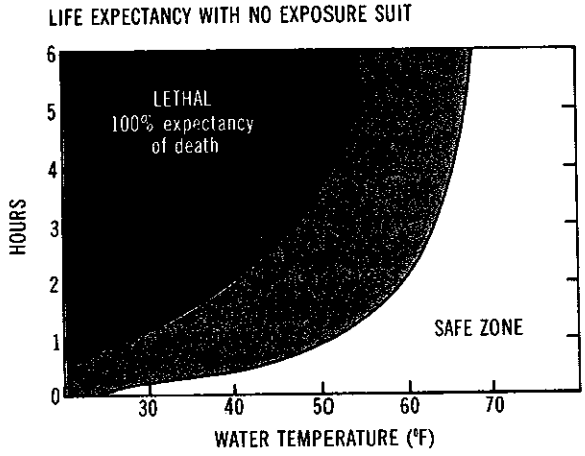

Fig. 8–1. Survival in cold water.

* The aviation term *ditching* as used here means the forcible abandonment of a vessel or aircraft in open water. The *ditch survivor* is one who immediately survives the abandonment, whether immersed or immediately evacuated to a survival craft. The terms *ditch survivor* and *castaway* are used interchangeably.

These practical suggestions should be followed prior to forced abandonment of a vessel:

- Dress as warmly as possible! Wear an exposure suit and waterproof gloves, if available. Even wet clothing insulates the body against cold.
- Wear a lifejacket. Bulky lifejackets will not interfere with a person's ability to float or swim.
- Bring any personal medicines taken regularly.
- Eat or drink nothing before entering the water because the colder temperature may cause stomach cramps. Alcohol especially is dangerous, because it causes rapid heat loss and impairs judgment.
- If it is necessary to jump into the water, jump feet first. Hold both arms over the head and try to make a vertical entry into the water.

Landing in a sitting position may result in fractures of the midspinal column or other internal injuries, especially to the kidneys. Landing in a horizontal position often will result in lung, kidney, or other internal injuries. Diving headfirst into the water may result in injury to the head and neck. (These facts are useful when diagnosing a survivor's injuries. If a castaway has been injured, try to find out how the person entered the water.)

- Do not thrash about or swim farther than is necessary. This wastes energy, and by increasing the flow of water around the body, activity may cause more rapid cooling.
- Remain as calm as possible. Panic when entering the water might result in holding one's breath. Then gasping will occur, causing an intake of water into the lungs.
- If time permits, put extra blankets, clothing, water, and food into survival crafts. Extra weight can be jettisoned later, if necessary.

SURVIVOR PICKUP BY SURVIVAL CRAFT (Lifeboat or Raft)

Surviving in a lifeboat or liferaft (here after referred to as the survival craft) is one of the most strenuous ordeals an individual can face. It involves combat against all the elemental forces at sea, one's own physical limitations, and—most of all—fear, hysteria, and despair. Thus, before picking up survivors, or as soon as immediate rescue operations have been completed, a firm chain of command, based on previous positions of authority must be established aboard the vessel. The individual in command of a survival craft (referred to in this chapter as the Captain) is responsible for the immediate welfare (physical safety, medical condition, and morale) of its crew, as well as the survivors.

Before deciding whether to continue searching for castaways, the Captain must consider the sea and weather, the condition of survivors already aboard, and if known, survivors' prior physical condition, age, length of time in the water, and how they entered the water. Spending excessive energy in search activities is physically harmful and demoralizing to the crew of the survival craft.

When injury to a survivor is suspected, the same methods outlined in general first aid instructions should be used in the transfer to lifeboat or raft. Before hauling a castaway aboard, it would be wise to inquire about injuries.

The Captain of the survival craft must be the one to decide how long resuscitative efforts on unconscious victims should be continued; how food, water, and medical supplies are distributed; and when to signal for help.

IMMEDIATE MEDICAL PROBLEMS ABOARD SURVIVAL CRAFT

Trauma

Injuries should be handled as outlined in Chapter III. However, it is possible that a prepared medical survival kit might not be available; so the rescuers will have to improvise. Under such conditions, the following principles are suggested.

The first objective in caring for any injured person is to provide lifesaving treatment. Without equipment this may be accomplished by:

- Controlling hemorrhage with direct pressure.

• Giving mouth-to-mouth resuscitation when needed.

• Treating absent pulse or cardiac stoppage by cardiopulmonary resuscitation (See p. IV–1.)

• Treating shock by placing a survivor's head lower than the rest of his body; and keeping him warm.

• Treating fractures by strapping the extremity to the opposite side, if nothing is available which can be used for splinting. For example, splint one leg to the other, one arm to the chest, or one forearm to the other (with hands touching elbows).

• Relieving pain by simple reassurance, if medicines are not available.

Drowning

Those rescued promptly from drowning usually recover spontaneously, if uncomplicated by an abnormally lowered body temperature (hypothermia).

Treatment

Treatment for victims who almost drowned should consist of immediate mouth-to-mouth resuscitation and external cardiac massage, if needed. It has been established that *nearly-drowning in fresh water* requires different follow-up care after initial emergency treatment, than from *nearly-drowning in saltwater*. However, on a survival craft, the emergency treatment will be about the same for those rescued from drowning in both salt and fresh water. The only difference would be to provide extra fresh water rations for the victim rescued from drowning in saltwater, as soon as he is able to drink.

If there is trouble breathing, mouth-to-mouth resuscitation may be helpful, even though the victim is breathing on his own. Efforts to drain water from the lungs of those rescued from drowning generally are not indicated or helpful, and should not be attempted. However, victims tend to swallow large volumes of water and their stomachs may become distended. This distention impairs ventilation and circulation, and should be alleviated as soon as possible. (See Cardiopulmonary Resuscitation, p. IV–1, and Drowning, p. IV–18.)

Generalized Hypothermia (Acute) Due to Immersion

As mentioned previously, generalized hypothermia is the leading cause of death among shipwrecked survivors. The ability to recognize and treat this condition is essential. Generalized hypothermia commonly occurs in most survivors extracted from cold water. These victims are strikingly pale, frequently have generalized muscular rigidity, are shivering, and exhibit varying levels of consciousness and shock.

Treatment

Victims aboard the survival craft who exhibit the above symptoms of generalized hypothermia should be assumed to have subnormal body temperatures. Treatment by rapid warming should be started promptly. The victims should be wrapped in blankets and warm clothing, if available, and warmed as fast as possible to reduce further heat loss. Lying close to others under covers may speed the warming process.

There will be a high risk of ventricular fibrillation and cardiac arrest as the body warms again. Should cardiac arrest occur, it should be treated immediately with a blow to the midchest and then if necessary with external massage and artificial respiration. (See p. IV–1+.)

Nothing should be given by mouth for 24 hours. Both alcoholic beverages and smoking should be avoided during this period.

Emotional Factors

Under ideal conditions the healthy uninjured person may be able to survive three days at sea in a lifeboat or raft. However, survival for longer than one month is not uncommon. The single most important factor in castaway survivorship is the poorly defined ***WILL TO LIVE.*** This has been proved time and again in sea disasters and ditchings. Often survivors made every mistake in the book, but were saved by their determination to live.

The actions and emotional stability of the castaways depend first upon the morale and psychologic strength of both the group and the individual. A group of experienced seamen, for instance, will be psychologically stronger

to face ditching than a group of dependents. That individuals vary greatly, both mentally and physically, in their reactions to stress is self-evident and needs no discussion. Also, injuries sustained during ditching or aboard the liferaft may be new trauma for some castaways, while for others it may be an aggravation of preexisting medical or psychiatric conditions. Mental derangement may appear anytime, before or after the rescue.

As time is spent on the survival craft awaiting rescue, the group's morale may weaken seriously. Keeping survivors active is important. An assignment to various tasks—nursing care, supply tally, rescue watch, among other activities—will divert and occupy the mind and may help to keep hopes high. Lone survivors should make every effort to conserve energy and resources. They may imagine that they hear voices, or see things which are not really there. Keeping the mind active with mental exercises, may help to prevent this state.

Recognition and treatment of mental disturbances is the duty of all survivors, but the ultimate responsibility rests with the Captain of the survival craft. Anxiety is most contagious and can well destroy chances for survival on the open sea. Immediately after rescue, bewilderment and disbelief are to be expected, and some victims will be hysterical and agitated.

Treatment

The best treatment for anxiety is to reassure patients and assign small tasks to keep them occupied. Acute agitation should be treated promptly, as the situation demands. For some victims forcible restraint may need to be applied. Morphine sulfate 10 mg may be given intramuscularly and may be repeated every four hours as needed to calm the anxious person.

OTHER MEDICAL PROBLEMS ABOARD SURVIVAL CRAFT

1. Preexisting Medical Problems

Preexisting medical problems often call for a change in management on the survival craft. Unless withdrawal of prescribed medications is life-threatening, they should *not* be taken while awaiting rescue.

Prescribed medications which *should* be continued are digitalis preparations, medicines for the control of epilepsy (other than barbiturates), cortisone-like drugs, and nitroglycerin. Other medicines should be withheld unless there is danger of an immediate and serious medical problem.

2. Seasickness

Seasickness (motion sickness) is an acute illness characterized by loss of appetite, nausea, dizziness, and vomiting. Preventive measures often are effective. However, attacks of motion sickness are difficult to treat.

Treatment

Those known to be prone to seasickness should be given cyclizine hydrochloride 50 mg every four to six hours by mouth, if it can be retained.

3. Sunburn

Sunburn is one of the principal medical hazards of survival on the open sea, regardless of latitude. It may vary from a first to a third degree burn, depending upon the exposure and protection available to the victim. Initially, sunburn is generally characterized by redness, edema, and tenderness of the skin. It may be accompanied by local pain, fever, nausea, vomiting, diarrhea, weakness, or even prostration.

Sunburn is prevented by keeping fully clothed at all times, and if possible, staying under a canopy. Survivors should avoid looking directly into the sun or at the glare from the water. Those aboard the survival craft should wear sunglasses during all daylight hours. In addition to these obvious precautions, a sunscreening agent should be applied liberally to all exposed body parts, during periods of exposure to strong sunlight.

4. Injuries due to Marine Animals

Injuries from marine animals include not only direct trauma, but chemical poisoning and allergic reactions such as those caused by animals like the jellyfish, Portuguese man-of-war, and stingrays. Local symptoms may vary from hives to blisters to painful swellings, depending on the animal contacted. Generalized symptoms

of headache, sneezing, difficult breathing, fever, and chills may be present.

Treatment

The body area affected should be cleansed thoroughly for conditions caused by marine animals. Acetaminophen 600 mg may be given for pain and fever or chills. The patient should be kept warm. For difficult breathing with wheezing, a 0.5 ml injection of epinephrine hydrochloride 1:1000 should be given subcutaneously.

5. Hydration and Nutrition

If rescue is delayed, maintaining both hydration and nutrition aboard the survival craft are likely to become progressively more serious problems. Food supplies are less essential than water. Lifeboat stores often are limited to hard candy, which provides a small amount of energy. Its main value is boosting the morale of hungry survivors.

Although survival craft (lifeboats and liferafts) carry a limited quantity of potable water, they may be equipped with desalting kits or a solar still which would provide additional drinking water. Each desalting kit provides about one pint of safe drinking water. Although the water is likely to be acrid and discolored, it is safe when prepared according to the instructions on the kit. The capacity of a solar still is limited; it will yield about eight pints of water per day in temperate climates with sunlight. This distilled water looks and smells better than the water produced by desalination. Efforts should be made to store rainwater.

If it is likely that more than one day will pass before rescue, minimal water should be issued during the first 24 hours. This will allow the body to activate water-saving mechanisms that later will reduce the need for water. Survivors who have spent some time in the water, or who have swallowed seawater, may have a demanding thirst; this should be satisfied partially. After the first day, one pint of water daily per person should be consumed. If stores are adequate while in tropical climates, the ration should be increased beyond one pint per day to compensate for excessive loss of water due to sweating.

6. Heat Exposure Injuries

Special problems are created aboard survival craft by exposure to tropical heat. In certain circumstances, fluid loss by sweating alone can be extremely high. The body will adjust to exceptional heat to some extent, but full acclimatization rarely occurs.

Dehydration

Dehydration can be prevented by minimizing activity during the daylight hours and by making best use of clothing or a canopy.

Treatment

Treatment for dehydration consists of increasing the water ration, as supplies permit. (See section 5, above.)

Heat Exhaustion

Heat exhaustion is caused by a loss of body water and salt. (For symptoms and treatment, see p. III–1.)

Heat Cramps

Heat cramps are painful spasms of the muscles of the extremities, back, or abdomen due to salt depletion. The skin usually is moist and cool with muscle twitching frequently present. (For other information and treatment, see p. III–57.)

Heatstroke (Sunstroke)

Heatstroke is a medical emergency. (For discussion and treatment, see p. III–57.)

MEDICAL RESOURCES ABOARD LIFEBOAT

Lifeboats, liferafts, lifefloats, and buoyant apparatus are required by regulations * to be provided with certain provisions. This required equipment must be of good quality, efficient for the purpose they are intended to serve, and kept in good condition. The lifeboats for ocean and coastwise seagoing self-propelled vessels must be equipped with a *First Aid Kit (U.S. Coast Guard Approved)*. The provisions for approval and the contents of the *First Aid Kit* are stated in 46 CFR 160.041.

* Title 46, Code of Federal Regulations, Parts 33, 75, 94, and 192.

Table 8-1
Medical Survival Kit [1]
***Suggested* for Lifeboats Aboard Merchant Vessels**

Description of Item	Unit	No. of Units	Comments
Medications			
Acetaminophen Tablets, 300 mg, 100s	bot.	1	Minor aches or pain, antipyretic
Cyclizine Hydrochloride Tablets, 50 mg, 100s	bot.	5	Seasickness, mild antihistamine
Diphenylhydantoin Sodium Capsules, 100 mg, 100s	bot.	1	Anticonvulsant antiepileptic
Diazepam Tablets, 5 mg, 100s[2]	bot.	3	Tranquilizer
Diphenoxylate Hydrochloride 2.5 mg and Atropine Sulfate 0.025 mg, Tablets, 100s[3]	bot.	1	Antidiarrheal
Epinephrine Hydrochloride Injection, 1:1000, 1 ml disposable cartridge, 10s	pkg.	1	Asthmatic attack, or difficulty in breathing after marine animal trauma
Morphine Sulfate Injection, 10 mg/ml, 1 ml Disposable Cartridge, 10s[4]	pkg.	1	Analgesic, sedative
Sodium Chloride, 1g Tablets, 100s	bot.	1	Heat cramps
Sunscreen Preparation	pkg.	40	Protection against sunburn
Tetracycline Hydrochloride Capsules, 250 mg, 100s	bot.	2	Broad spectrum antibiotic
Surgical Supplies			
Bandage, Elastic, 4 in, Roll, 12s	box	1	
Bandage, Gauze, Roll, Sterile 4 in x 10 yd 12s	box	1	
Bandage, Absorbent, Adhesive, ¾ in x 3 in, 100s	box	1	
Insect Repellent	bot.	2	
Pad, Sterile, 4 in x 4 in, 100s	box	2	
Scissors, Bandage, Lister	each	1	
Soap, Surgical	cake	20	
Sunglasses	each	20	
Syringe, Hypodermic Cartridge Holder[5]	each	2	
Tape, Adhesive, Surgical, 2 in x 5 yd, Roll, 6s	box	1	
Thermometer, Clinical, Fever	each	2	

[1] To be available for forced abandonment of a vessel in cold water areas and infrequented waterways.
[2] Controlled Substance, Schedule III.
[3] Controlled Substance, Schedule V.
[4] Controlled Substance, Schedule II.
[5] Disposable cartridge for medication and syringe holder should be purchased from an identical supplier, to make sure that the cartridge will fit the syringe.

When ships travel infrequently-used waterways or in colder climates, it is advisable to have *in addition* a more comprehensive survival kit (in waterproof packaging) prepared and ready to be placed aboard lifeboats or liferafts, when needed. The proposed contents of such a kit are shown in Table 8–1. This list of medications and surgical supplies is planned for a complement of 20 to 30 survivors for a period of one week.

The Master should assign the individual in charge of the *Sickbay and Medicine Chest* to prepare *Medical Survival Kits,* or have them prepared ashore. The person designated by the Master to be responsible for these kits should store them in a compartment that can be maintained at temperatures above freezing, *but not above room temperature. On abandoning ship,* it would be this individual's responsibility to see that the officer-in-charge of a lifeboat receives such a kit. *Morphine sulfate injectable dosages may be stored in these kits. However, the ship's compartment in which morphine sulfate is stored should be locked securely at all times, and checked at frequent intervals by the Master. The Master and the officer concerned should be the only ones with the key or lock combination.*

SEARCH AND RESCUE PRIORITIES

1. Safety of Rescuers

Vessels responding to a distress call must consider the same problems that confront Captains of survival crafts: factors of sea and weather, the condition of survivors already picked up, probable condition of missing victims, and the condition of the rescue ship and crew. ***The lives and safety of the rescue crew must be the first consideration.*** The treatment of survivors will depend on the nature of the rescue facility, and the number and medical condition of the survivors.

2. Condition of Survivors (Triage Groups)

Personnel on the rescue vessel should sort rapidly all survivors according to their physical condition. The sorting or triage categories are:

(a) Those with minor injuries whose condition will not be worsened by delay in treatment.

Treat these last or as time permits. If their condition warrants, they may be put to work helping with the emergency or relieving others who can help.

(b) Those sick or injured but potentially treatable with facilities at hand.

This includes those who urgently require medical attention. Some in this group may be given first aid and relegated to triage group (a). For example, a broken arm could be splinted quickly and be set later, after other more critical problems are taken care of.

(c) The dead and the dying.

The dying are those who probably will not survive with the treatment available. They may be difficult to identify. This group should be treated after group (b) but before group (a). Within this group, try to pick those with the best chances for survival *before* the less hopeful cases.

MEDICAL PROBLEMS OF THE RESCUED CASTAWAY ABOARD RESCUE VESSEL

1. Drowning

Victims rescued from drowning must receive immediate treatment as previously discussed in this chapter on p. VIII–3; and in more detail under Cardiopulmonary Resuscitation and Drowning, p. IV–1. Although there are different physiological variations from freshwater and seawater submersion in drowning, it is again emphasized that basic life support resuscitation procedures are the same for both. *Also, every submersion victim, even one requiring minimal treatment, should be evacuated to a hospital for follow-up care.*

2. Cold Exposure Injuries, Local

For discussion of the emergency treatment for local cold exposure injuries (Chilblain, Immersion Foot, Trench Foot, and Frostbite), see p. VIII–20.

3. Generalized (Immersion) Hypothermia, Acute, Wet Cold, Aboard the Rescue Vessel

Hypothermia is a life threatening condition. The following treatment plan requires medical supervision, if at all possible. **Obtain medical advice by radio as soon as possible.**

The best research available for treatment of hypothermia may be summarized as follows:

A. The evaluation and treatment of hypothermia whether wet or dry, on land or water, is essentially the same. Therefore, the following discussion does not specifically distinguish between chronic and acute, or wet and dry hypothermia.

B. In the cold patient, a rectal temperature is one of the vital signs. In terms of the ABC's, think:

A—Airway
B—Breathing
C—Circulation
D—Degrees

C. **"Low Reading" thermometers are important in the care of the hypothermia patient. Regular thermometers are useless and probably dangerous in this setting.**

D. Obtaining a temperature is important and useful for treating hypothermia. However, there is tremendous variability in individual physiologic responses at specific temperatures. In addition, there will be times when a low reading thermometer is not available. Therefore, these guidelines are not based on the patient's measured temperature.

E. Axiom: With the hypothermia patient, THINK HEAT.

1. No cold I.V.'s.
2. No cold ventilation therapy.
3. No cold treatments of any kind.

F. Unheated oxygen should not be used for the hypothermia victim because it will add cold to the victim. Attempt to administer warm, moist oxygen if possible.

G. We must, at least, *prevent further heat loss at the core.* This can only be done by insulating the entire patient, plus adding heat to the "core areas" (head, neck, chest, and groin).

H. *Add heat* gradually and gently:

(The term "add heat" is used rather than "rewarm" because often the patient is not actually any warmer with the addition of heat, but rather only a further decrease in core temperature is minimized.)

1. Apply external warm objects to the head, neck, chest and groin. Use:
   a. Hot water bottles.
   b. "Warm packs" (chemical heat packs must be used with great care so as not to burn the patient's skin, e.g. wrap in a towel and watch carefully).
   c. Warm rocks wrapped in towels.
   d. Warm bodies, etc.
2. Administer warm, moist air or oxygen.

I. Do not ever try to cool the extremities or use tourniquets or other occlusive dressings.

J. Be wary of statements or actions while working on patients who are unconscious or requiring CPR. These patients frequently remember what is done and said and it can produce severe psychological problems later on. This statement applies equally well to warm and cold patients.

A. *Some General Points*

1. Treat to the level of your ability as your equipment and skills dictate.
2. All patients should be stabilized before any transport to a facility. The patient should be kept on board until the patient is stable.

B. *Evaluation*

1. Initial attention to the ABC's and CPR as needed.
2. Vital signs, including rectal temperture.
3. Brief history.
4. Brief physical exam:
   a. Feel for skin coldness or warmth.
   b. Level of consciousness.
   c. Cardiopulmonary exam.
   d. Associated trauma.
5. Suggested laboratory and x-ray evaluation, depending on availability.

a. Chest x-ray.
b. 12 lead electrocardiogram.
c. Urine urinalysis, sodium and osmolaloty.
d. Blood: CBC, BUN, creatinine, electrolytes, sugar, platelets, PTT, prothrombin time, liver function tests, amylase.
e. Arterial blood gases.
f. Weight.

C. *Monitoring and Treatment*

1. Basic treatment is the same.
2. Cardiopulmonary monitoring.
3. An I.V. and/or central venous pressure line (in the superior vena cava, not the right heart), with D_5W at 75 cc's per hour. I.V. fluid and rate of infusion will vary depending on the patient's level of hydration and laboratory data.
4. Urinary bladder catheter.
5. Nasogastric tube, if the patient is unconscious and the airway is protected.
6. Endotracheal/Nasotracheal tube is indicated in the unconscious patient after careful neck evaluation.
7. Daily weights: I & O.
8. Always ventilate with warm, moist air or oxygen. (Typical unwarmed ventilation is approximately 72°F [22°C].)
9. Sodium bicarbonate administration is based on arterial blood gases.
10. Continue monitoring until stable and warm.

D. *Adding Heat*

1. The recommended possibilities include:

External Methods	*Internal Methods*
a. Gradual spontaneous rewarming.	a. Warm steam inhalation/ ventilation.
b. Warming blankets, warming mattresses, etc.	b. Peritoneal lavage,
c. Tub bath.	c. Warm I.V. fluids.
	d. Extracorporeal circulation (AV shunt).

2. Regardless of the method chosen for adding heat, the patient must be under total physiologic control, to allow you to deal with the metabolic needs of the patient.
3. Tub bath is one of the most rapid methods and requires *immediate* laboratory results and extremely close physiologic monitoring to maintain control of the situation.
4. Do not compromise extremity circulation by using tourniquets, pneumatic antishock garments or ice packs.
5. The recommended temperature is about 105 to 110°F (40° to 43°C) for all methods.
6. *For Severe Hypothermia without Signs of Life (Requiring CPR)*: Warm the core as rapidly as you can handle, using one or more of the methods. (For example, warming mattress, warm steam inhalation, *and* peritoneal lavage), trying to get the patient warmer than approximately 85° F (30° C).
7. *For Severe Hypothermia with Life Signs*: Use your judgment, using one or more of the methods.

E. *Most Common Problems*

Note: Drug therapy should be moderated because in the cold patients medications are both inefficient and poorly metabolized.

1. *Arrhythmias*—these are usually atrial arrhthmias:
   a. If patient is very cold, these atrial arrhythmias will usually convert spontaneously with rewarming.
   b. If the temperature is rising and the arrhythmia does not convert, you many want to use the usual antiarrhythmic medication.
   c. If the treatment is not working, add more heat.
   d. Ventricular fibrillation in the very cold patient is treated with CPR, adding heat, and cardioversion after the temperature reaches approximately 85° F (30° C).
   e. In the patient whose temperature is rising, the standard treatment for ventricular fibrillation should be utilized. (AHA, others).

2. *Dehydration*: Monitor and treat accordingly.
3. *Hyperkalemia*: Monitor and treat accordingly. (Do not infuse potassium in I.V.'s)
4. *Hyperglycemia*: Monitor and treat accordingly.

Much can be done to reduce the consequences of hypothermia by educating the seafarer on what he can do in a practical way to improve his survivability. Such education should include the following information directed at his level of understanding.

Your Body

An understanding of how your body reacts to cold air or water exposure and knowing the steps you can take to help your body delay the damaging effects of cold stress, will help you in your struggle to stay alive in the event of cold water exposure.

Nature requires that your body core be kept at an ideal temperature of 98.6°F (37°C). A network of blood vessels running through the core and the outer layer of your body picks up the heat produced by the "furnace" within the core, and distributes that heat throughout the body. Nature also gives your body a very accurate system to automatically regulate the core temperature at 98.6°F (37°C). For example, if the temperature conditions around you are high, as it would be on a warm day or in a hot boiler room, the blood vessels near the skin of your body will enlarge, allowing more blood to flow to the skin area and give off greater amounts of body heat. This is to keep you comfortable and to keep the core temperature 98.6°F (37°C) from rising. However, if the surroundings are cool, your body will constrict your blood vessels at the skin surface and keep that valuable body heat from being lost too rapidly.

Hypothermia

The loss of body heat is one of the greatest hazards to the survival of a person in the sea. The rate of body heat loss depends on water temperature, the protective clothing worn, and the manner in which the survivor conducts himself. An abnormally low body core temperature can be recognized by a variety of symptoms. Very early during exposure, the body tries to combat the excessive heat loss both by constricting its surface blood vessels (to reduce heat transfer by blood to surface) and by shivering (to produce more body heat). However, if the exposure is severe, the body is unable to conserve or produce enough heat. Its core temperature begins to fall, creating a condition known as "hypothermia". As the body core temperature approaches 95°F (35°C), it starts to fall more rapidly. By then discomfort, tiredness, poor coordination, numbness, impaired speech, disorientation, and mental confusion appear. As the internal temperature decreases into the 80's (below 32.2°C) unconsciousness may result, as well as a bluishness of the skin, collapse of the veins in the skin, enlargement of the pupils, and muscle stiffness.

The heart becomes irregular and the pulse barely detectable. Although death may occur whenever the core temperature is below 90°F (32.2°C) it is very difficult to be sure whether the patient is alive or dead when the body core temperature is below 85°F (29.4°C). Death is then defined as failure to revive on rewarming.

If you are involved in a ship casualty and are forced to abandon, your survival procedure should be preplanned, thereby increasing your chances for a successful rescue. Records show that ship sinkings, even in the worst cases, usually require at least 15 to 30 minuts for the vessel to fully submerge. This affords valuable time for preparation. Here are some sound pointers for you to remember in a situation of this type:

1. Put on as much warm clothing as possible, making sure to cover head, neck, hands, and feet.
2. If an immersion (exposure) suit is available put it on over the warm clothing.
3. If the immersion (exposure) suit does not have inherent flotation, put on a lifejacket and be sure to secure it correctly.
4. All persons who know that they are likely to be affected by seasickness should, before or immediately after boarding the survival craft, take some recommended preventive tablets or medicine in a dose recommended by the manufacturer. The incapacitation caused by seasickness interferes with your survival chances; the vomiting removes precious body fluid while seasickness in

general makes you more prone to hypothermia.

5. Avoid entering the water if possible. Board davit-launched survival craft on the embarkation deck. If davit-launched survival craft are not available, use overside ladders, or if necessary lower yourself by means of a rope or fire hose.
6. Unless it is unavoidable do not jump from higher than 5 meters (16.4 feet) into the water. Try to minimize the shock of sudden cold immersion. Rather than jumping into the cold water, try to lower yourself gradually. A sudden plunge into the cold water can cause rapid death or an uncontrollable rise in breathing rate may result in an intake of water into the lungs. On occasions it may be necessary to jump into the water; if so, you should keep your elbow at your sides, cover your nose and mouth with one hand while holding the wrist or elbow firmly with the other hand. One should not jump into the water astern of the liferaft lest there is any remaining headway on the ship.
7. Once in the water, whether accidently or by ship abandonment, orientate yourself and try to locate the ship, lifeboats, liferafts, other survivors or other floating objects. If you were unable to prepare yourself before entering the water, button up clothing now. In cold water you may experience violent shivering and great pain. These are natural body reflexes that are not dangerous. You do, however, need to take action as quickly as possible before you lose full use of your hands; button up clothing, turn on signal lights, locate whistle, etc.
8. While afloat in the water, do not attempt to swim unless it is to reach a nearby craft, a fellow survivor, or a floating object on which you can lean or climb. Unnecessary swimming will "pump" out any warm water between your body and the layers of clothing, thereby increasing the rate of body-heat loss. In addition, unnecessary movements of your arms and legs send warm blood from the inner core to the outer layer of the body. This results in a very rapid heat loss. Hence, it is most important to remain as still as possible in the water, however painful it may be. Remember, pain will not kill you, but heat loss will!
9. The body position you assume in the water is also very important in conserving heat. Float as still as possible with your legs together, elbows close to your side and arms folded across the front of your lifejacket. This position minimizes the exposure of the body surface to the cold water. Try to keep your head and neck out of the water. Another heat conserving position is to huddle closely to one or more persons afloat, making as much body contact as possible. You must be wearing a lifevest to be able to hold these positions in the water.
10. Try to board a lifeboat, raft, or other floating platform or object as soon as possible in order to shorten your immersion time.

    Remember, you lose body heat many times faster in water than in air. Since the effectiveness of your insulation is seriously reduced by water soaking, you must now try to shield yourself from wind to avoid a wind-chill effect (conventive cooling). If you manage to climb aboard a lifeboat, shielding can be accomplished with the aid of a canvas cover or tarpaulin, or an unused garment. Huddling close to the other occupants of the lifeboat or raft will also conserve body heat.
11. Do not use "drownproofing" in cold water. "Drownproofing" is a technique whereby you relax in the water and allow your head to submerge between breaths. It is an energy saving procedure to use in warm water when you are not wearing a life vest. However, the head and neck are high heat loss areas and must be kept above the water. That is why it is even more important to wear a lifevest in cold water. If you are not wearing a vest, tread the water only as much as necessary to keep your head out of the water.
12. Keep a positive attitude about your survival and rescue. This will improve your chance of extending your survival time until rescue comes. Your will to live does make a difference!